Exploring TDS: Measuring Water Quality and Impact on Environment

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Introduction-

- TDS stand for "Total Dissolved Solids".
- TDS is a collection of substances that can be molecular or micro granular in size, and can be made up of both organic and inorganic materials. (Vandas, S. 1994)
- It involves Bacteria which can cause for risk of health conditions.
- The types of bacteria focused on are E-coli and Coliforms which originate from feces and sewage wastes. (Vandas, S. 1994) Figure 1
- One thing worth noting is that we also determine the number of each bacteria to indicate the presence of fecal contamination and it gives a general indication of sanitary condition in waters.
- It originates from natural sources, sewage, urban run-off, and industrial waste-waters. (Cooke, wm. B. 1954)
- Some gaps in the knowledge is whether the amount of water varies. For example, a pond might be more contaminated due to having less free water than a lake.
- The Objective of this research is to determine whether TDS levels will increase or decrease the farther the water is form the surface.
- We hypothesized that the farther the distance the less TDS will be found due to being farther away from the surface.

Methods-

- The experiment was conducted at Saint Claire's Metropark. (Figure 2)
- We took a total of 6 test tubes 100 mL each and 2 in each spot of the D portion of the map. There were 3 portions of the D part of the map labeled D1, D2, and D3. (Figures 3 4 and 5)
- Our experiment was found in small ponds. (Figure 3, 4, 5)
- The experiment used a sterile vessel of 100 mL of each sample and shook it until the reagents dissolved.
- After, we poured the mix into a quanti-tray sleeve (figure 1).
- After sealing the tray with an IDEXX sealer we placed the tray in for 35 + or - 0.5 Celsius incubator for 24 hours.
- In the end the trays were ready to show results.
- We used a correlation graph as it matched best with the TDS data(figure 7 and 8).

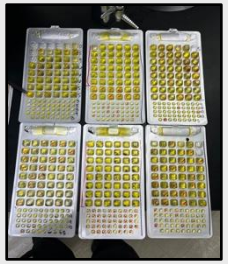

Figure 1- Quanti tray of all 6 samples

Figure 2- Map of Metropark

Figure 3- Map of D portion area 1

Figure 4- Map of D portion area 2

Figure 5- Map of D portion area 3

Figure 6- TDS test scanner

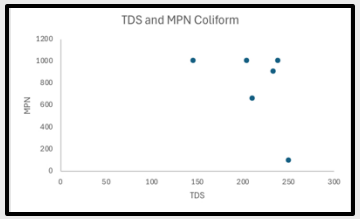

Figure 7- Graph of Coliform

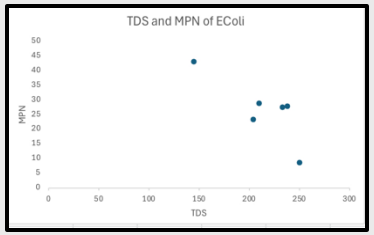

Figure 8- Graph of E-coli

Results-

- The r-value of 0.6 for E.coli indicates a moderate positive correlation, but with a p-value of .208. This result is not statistically significant.(Figure 8)
- The r- value of 0.57682 for coliform indicates a moderate positive correlation; however, with a p-value of .23073, this result is not statistically significant. (Figure 7)
- The MPN or cells per 100 ml for coliform has an average of about 786, which was much higher than our E.coli MPN.(Figure 7)
- The MPN amount/cells per 100 ml for E.coli was about 27 cells per 100 ml, which was much lower than the collected coliform MPN.(Figure 8)
- The EPA limits for coliform was 400 MPN and for E.coli was 235 MPN. So, both of our results are way off the healthy limits of water. One being in the 700s and the other being below 30.
- The average TDS for the 3 areas in D was 213.3 ppm.

Discussions-

- After testing our waters coliform we found out that the EPA limits were much lower than the amount tested, making the cells per 100ml very unhealthy.
- Along with that after testing our water samples for e-coli we found out it has much less MPN than the healthy amount recommended by the EPA.
- After testing the r-value and the p-value we found out that the results are not significant.
- We had a single data error with one our samples being under filled which could of resulted in less TDS causing for the MPN and P-value to wrong.
- Overall, Saint Claire Shores Metro Park water is not up to date for the EPA water limit standards, so the water is unhealthy.
- For future studies test different areas of Saint Claire Metro Park that have different surroundings. For example, testing water for TDS near parking spots or near buildings/playgrounds.
- From this study you can determine whether the location has something to do with the amount of TDS and whether natural locations are better off than industrial locations.
- For our study we collected water samples from areas of water in the woods, which could of caused the TDS and other bacteria samples to be higher.

Literature cited-

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